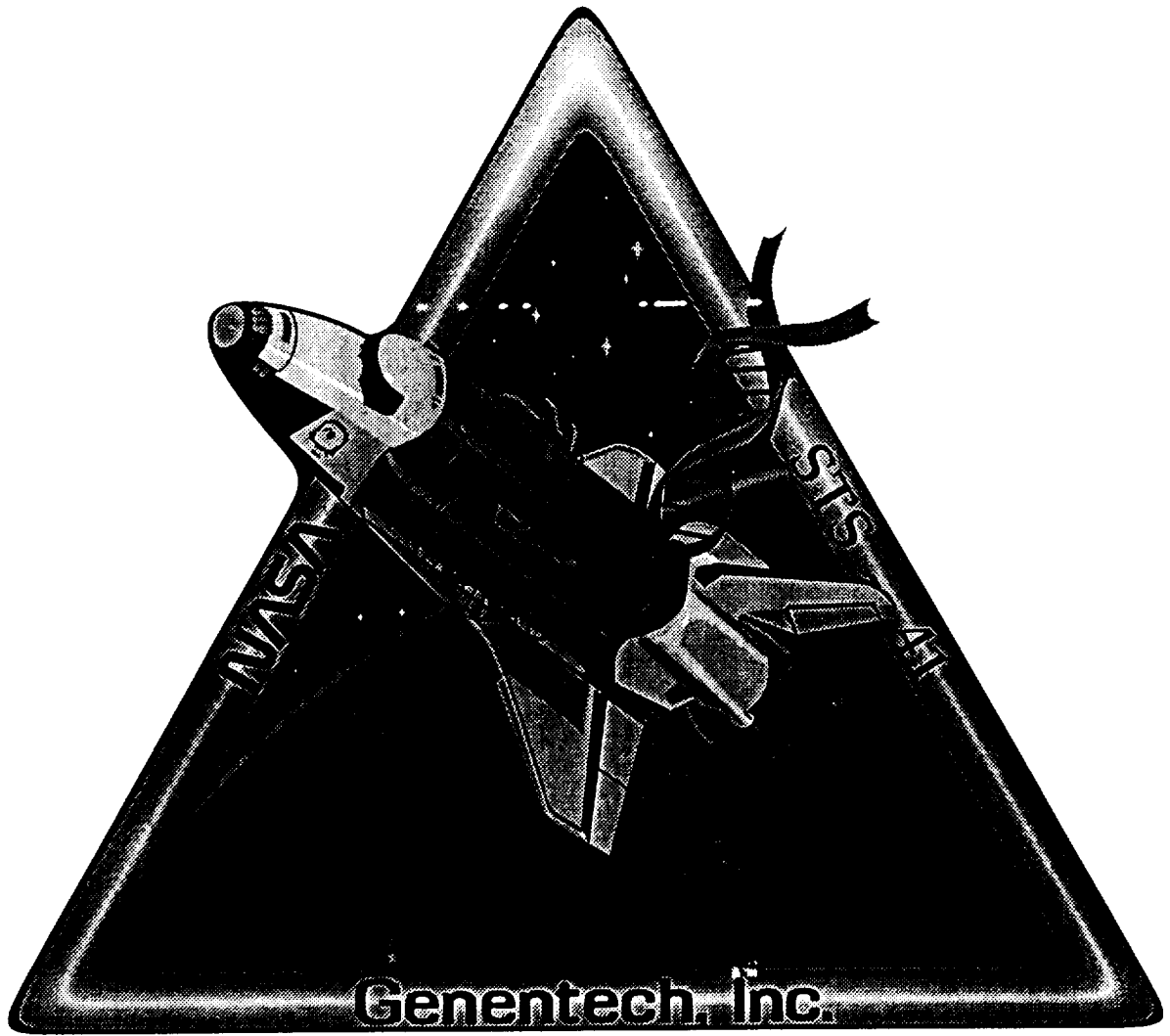


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**Center for Cell Research
Pennsylvania State University**

**Dr. Mike Cronin
Director of Endocrine Research
Genetech, Inc.**



INTRODUCTION

GENENTECH IS GRATIFIED TO BE THE FIRST BIOTECHNOLOGY COMPANY TO HAVE CONDUCTED A LIFE SCIENCES EXPERIMENT IN MICROGRAVITY.

AMERICANS HAVE DISCOVERED AND APPLIED MOST OF THE PREEMINENT SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS OF THIS CENTURY, INCLUDING THE GENETIC ENGINEERING OF PROTEINS FOR HUMAN HEALTH APPLICATIONS.

WE MUST IMPROVE OUR ABILITY TO RAPIDLY TRANSLATE ADVANCES IN PROCESS AND BIOLOGICAL SCIENCES INTO ECONOMIC AND HEALTH BENEFITS FOR THE AMERICAN PUBLIC.

GENENTECH, INCORPORATED

GENENTECH DISCOVERS AND PRODUCES BY
RECOMBINANT DNA TECHNOLOGY
PHARMACEUTICALS FOR HUMAN HEALTH.

- 1989 REVENUES OF \$476 MILLION
- **GROWTH HORMONE, TISSUE PLASMINOGEN
ACTIVATOR AND GAMMA-INTERFERON ARE
APPROVED BY THE FDA FOR TREATING GROWTH
HORMONE INADEQUACY IN CHILDREN, HEART
ATTACK AND CHRONIC GRANULOMATOUS
DISEASE IN CHILDREN, RESPECTIVELY**
- PARTIAL LIST OF PROTEINS IN CLINICAL TRIALS:
 - DNASE FOR CYSTIC FIBROSIS
 - INSULIN-LIKE GROWTH FACTOR FOR
DIABETES
 - RELAXIN TO FACILITATE CHILDBIRTH
 - HER-2 FOR BREAST AND OVARIAN CANCER

- ~ 40% OF OUR REVENUES REINVESTED IN R & D, TWICE THAT OF OUR NEXT COMPETITOR
- 2100 EMPLOYEES; 27% HAVE ADVANCED DEGREES
- ~ 1,500 PEER REVIEWED ARTICLES PUBLISHED IN THE PUBLIC LITERATURE BY GENENTECH SCIENTISTS SINCE 1977
- HOLD 88 PATENTS IN U.S. AND 672 ABROAD WITH 1076 PENDING

HISTORY OF PHYSIOLOGICAL SYSTEMS EXPERIMENT (PSE - 01)

1988 PENN STATE CCDS CONTACTS GENENTECH

1989 GENENTECH MEETS WITH NASA - AMES
RESEARCH CENTER SCIENTISTS AND
ADMINISTRATORS

GENENTECH, AMES AND PENN STATE
PRESENT PLAN TO MR. JAMES ROSE

MANIFESTED ON STS-41 IN DECEMBER

1990 FLIGHT CREW TRAINED FOR PSE-01

PSE-01 LAUNCHED ON DISCOVERY OCT 6

SCIENTIFIC RATIONALE

WE ARE INTERESTED IN THE REPORTS OF BONE AND MUSCLE WAISTING, AS WELL AS IMMUNE CELL DYSFUNCTION, THAT OCCUR IN MICROGRAVITY.

A NUMBER OF HUMAN DISORDERS ARE ASSOCIATED WITH MALADAPTIVE CHANGES IN BONE, MUSCLE AND IMMUNE FUNCTION.

THE ADJUSTMENTS TO SPACE FLIGHT MAY AID IN THE DISCOVERY OF NEW PROTEIN FORMS AND PATTERNS. THIS RESEARCH MAY ALSO PROVIDE STRATEGIES FOR PROTECTING THE HEALTH OF FLIGHT CREWS ENDURING PROLONGED SPACE FLIGHT.

WE MEASURED THE LEVEL OR EFFECT OF A NUMBER OF PROTEINS DURING PSE-01.

WE LEARNED

- PRECIOUS LITTLE IS KNOWN ABOUT PHYSIOLOGIC ADJUSTMENTS TO MICROGRAVITY.

THUS, OUR ABILITY TO CONTROL SOME IMPORTANT EXPERIMENTAL VARIABLES, AND TO PREDICT THE COMMERCIAL OPPORTUNITY, WAS LIMITED BY LACK OF EXPERIENCE AND KNOWLEDGE.

- NASA IS A COMPLEX AND DEMANDING ORGANISM.

TAKE HOME MESSAGE

PSE-01 FLEW AND LANDED ON TIME !

**HEALTHY SPECIMENS WERE
RETURNED TO US FOR ANALYSIS.**

**THE SYSTEM CAN WORK WITH PRIVATE
ENTERPRISE.**

GENENTECH SPACE SHUTTLE EFFORT 1990 (partial list)

Allen, Judy
Bancroft, Celeste*
Booker, Chris
Bowman, Terri*
Clark, Ross*
Crase, Dietrich*
Daugherty, Ann
Frankel, Lalaine*
Gantzox, Robin
Hancock, Bill*
Hansen, Stan*
Hollenbach, Cathy
Lai, Corazon*
Lyon, Becky*
Mauldin, Rita*
Moffat, Barbara*
Morita, Carol*
Mortensen, Debbie*
Nellen, Carol
Oeswein, J.Q.*
Powers, Don
Reyes, Joey
Rogers, Susan*
Runner, Mary*
Salud, Joe
Siegel, Mark
Tatum, Jane*
Terrell, Tim*
Trainor, Jim
Vega, Kathy*
Wenzel, Pat
Zamora, Sam
Peter Gribbling

Andow, Kerrie*
Beck, Steve
Booth, Richard
Briggs, Jonathan
Cook, Jennifer
Cronin, Mikie
DeGuzman, Leo
Fuchs, Hank*
God
Hotchkiss, Adair
Harris, Angela
Keller, Gilbert
Lee, Dave
Macario, Robin*
McCracken, Joe*
Mohler, Margie
Morita, again
Muphy, Jack
Niall, Hugh*
Osborne, Dave
Raygoza, Tino
Richards, Jim*
Roos, Filip
Rusher, Tamara
Schwall, Ralph*
Strasser, Joe*
Taylor, Robin
Tetlow, Sharon*
Vandlen, Dick
Webb, Dale
Woods, Kathryn*
Bill Lagrimas

THANKS

- NASA HEADQUARTERS, ARC, KSC AND JSC
- PENN STATE CCDS
- KIRK RAAB AND THE EXECUTIVE MANAGEMENT
OF GENENTECH

DEDICATION

PSE-01 IS DEDICATED TO THE MEMORY OF
MATTHEW MATLOCK, WHO DIED AT BIRTH DURING
THE FLIGHT OF DISCOVERY.